



Technical FAQ

AFF A800 Technical FAQ

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Abstract

Detailed answers about the new NetApp® high-end AFF A800 system, including its architecture, supported configurations, I/O capabilities, and environmental information.

TABLE OF CONTENTS

1	AFF A800 Overview	6
	What is the AFF A800 series?	6
	Are there other AFF A800 models?	6
	What are some of the new features in the AFF A800 family?	6
	What are the new AFF A800 model transitions?	6
2	AFF A800 Controller and Chassis.....	7
	Which components make up the AFF A800?	7
	What is the rack unit for the AFF A800 components?	7
	What are the AFF A800 model numbers?	7
	Which model string extensions denote HA?	7
	Are the AFF A800 controllers hot-swappable?	7
3	AFF A800 HA and Standalone Configurations	8
	Which standalone and HA configurations are supported on the AFF A800?	8
	What is the naming convention for the AFF A800 configurations?	8
	Are dual-chassis HA configurations possible on the AFF A800 series?	8
	Is MetroCluster available on the AFF A800 series?	8
	What is the rack unit for AFF A800 configurations?	8
	Which field upgrades are available with the AFF A800?	8
	Does hardware-assisted takeover work on the AFF A800?	8
	What are the NVRAM HA connections on the AFF A800?	8
	Which ports are used for the NVRAM HA connections on the AFF A800?	8
	Which ports are used for cluster interconnects on the AFF A800?	8
	Does the AFF A800 series support FlexArray?	9
	Does the AFF A800 series support Foreign LUN Import (FLI)?	9
	Does the AFF A800 support SnapLock?	9
	Where is the upgrade procedure for replacing existing controllers with AFF A800?	9
4	AFF A800 System Features	10
	Does the AFF A800 have onboard flash?	10
	How much memory and NVRAM does the AFF A800 have?	10
	Does the AFF A800 use all of the memory and NVRAM?	10
	Which type of processors and how many processing cores does the AFF A800 have?	10
	Which ONTAP release is required for the AFF A800?	10
	Which ONTAP build does the AFF A800 use?	10
	What are NVDIMMs, and do they work the same as traditional NVMEM and NVRAM?	10
	Does the AFF A800 destage NVlog data to flash for a persistent write record?	10
	Does the AFF A800 encrypt NVlog data before destaging NVRAM contents to flash?	11
	How does AFF A800 use its NVDIMM battery?	11
	How many destages does the NVDIMM battery support?	11
	How long does it take for the AFF A800 NVDIMM battery to charge?	11

Where are the NVDIMM battery material safety data sheets (MSDS)?	11
How does NetApp design its NVDIMM batteries to avoid potential lithium ion fires?	11
Does the AFF A800 series support remote management?	11
What are some of the BMC features?	11
Is the BMC connected to both Ethernet and the serial console?	11
What are the recommended BMC firmware levels?	12
What are the recommended BIOS levels on the AFF A800?	12
There is no nonmaskable interrupt (NMI) button on the AFF A800. How do I generate a core?	12
What are the system diagnostics in the AFF A800?	12
What is the boot medium in the AFF A800?	12
Is NetApp Volume Encryption (NVE) supported on the AFF A800?	12
Are NetApp ONTAP FlexGroup volumes supported on the AFF A800?	12
Does the AFF A800 have Trusted Platform Module (TPM) on the motherboard?	12
Does ONTAP or onboard key manager (OKM) use TPM?	12
5 AFF A800 I/O	13
What is the AFF A800 base I/O configuration per node?	13
What are the onboard AFF A800 ports?	13
What are the HA interconnect ports on the AFF A800?	13
What are the cluster interconnect ports on the AFF A800?	14
¹ Only recommended during upgrade from existing clusters using 10GbE cluster interconnects.	14
How can you determine cluster interconnect traffic?	14
How many slots does the AFF A800 have?	14
Which PCIe architecture does the AFF A800 use?	14
What are the supported SFP+ and cables on AFF A800?	14
Which protocols are available by host I/O adapter type on AFF A800?	14
Does the AFF A800 32Gb adapter support NVMe/FC?	14
Does the AFF A800 32Gb adapter support both target and initiator modes?	15
Do the 32Gb FC ports autorange?	15
What is the bandwidth for the dual-port 100GbE adapter?	15
How do I use 40GbE connections with the 100GbE adapter?	15
What are the supported cable types for 40Gb/sec and 100Gb/sec on the 100GbE adapter?	15
Can the 100GbE adapter ports run at separate speeds?	15
Do the 100GbE adapter ports fan out into multiple 40GbE or 10GbE connections?	15
Is the 25GbE adapter supported in the AFF A800?	15
What type of cable is used with 25GbE ports?	15
Does the 25GbE adapter also run at 10GbE speeds?	15
What is the maximum number of Ethernet ports supported on the AFF A800?	15
Where is the guide showing how to set up Cisco cluster interconnect switches?	15
Which management interfaces does the AFF A800 have?	16
Do the e0M and BMC ports support IPv6?	16
Are the external USB 2.0 ports supported?	16

Which USB device is formatted for use with the AFF A800?	16
Which use cases are allowed with the AFF A800 external USB ports?	16
At what speed does the AFF A800 serial console port run?	16
6 AFF A800 Storage.....	17
What type of SSD is used for the internal drives?	17
Are there other differences between NVMe SSDs and SAS SSDs?	17
What size NVMe SSDs are supported at AFF A800 launch in May 2018?	17
What NVMe SSD configurations are orderable on the AFF A800?	17
Can an existing SAS SSD be used internally on the AFF A800?	17
Are there requirements for installing NVMe SSDs in the AFF A800?	17
What is the maximum number of SSDs supported on the AFF A800 series?	17
What are the maximum aggregate and volume sizes on the AFF A800 series?	17
Why are the minimum root aggregate and volume so much smaller on the AFF A800?	18
Are system core files encrypted before being saved on the boot media?	18
Which shelves and shelf modules are supported on the AFF A800 series?	18
Is Advanced Drive Partitioning (ADP) supported on the AFF A800?	18
What approach is used by ADP to partition drives on the AFF A800?	18
Is there a demonstration video on how NetApp RAID-TEC™ works?	18
7 AFF A800 Chassis Power Supplies, Weight, and Thermals.....	19
What are the AFF A800 chassis dimensions?	19
What are the AFF A800 environmental details?	19
What are the AFF A800 weights?	19
What are the wattage and BTU ratings for AFF A800 HA pairs?	20
Does the AFF A800 support both 110V and 220V power?	20
How many power supply units (PSUs) does the AFF A800 have?	20
Are the AFF A800 power supplies assigned to a particular controller or to the chassis?	20
How many working power supplies are required to keep the chassis and nodes running?	20
Is there a two minute shutdown rule if a PSU is removed from the AFF A800?	20
What is the recommended rail kit for the AFF A800?	20
What is the Energy Star rating for AFF A800?	20
8 Supported Adapters	21
9 FRU List	22
10 System Validation and Quality Assurance	23
11 Version History	23

LIST OF TABLES

Table 1) Supported AFF A800 configurations.	8
Table 2) System memory for HA configurations.	10
Table 3) Processing cores for HA configurations.	10
Table 4) Recommended BMC firmware levels by ONTAP release.	12
Table 5) Recommended BIOS levels by ONTAP release.	12
Table 6) AFF A800 base configuration per node.	13
Table 7) AFF A800 onboard ports.	13
Table 8) AFF A800 HA interconnect options.	13
Table 9) AFF A800 cluster interconnect options.	14
Table 10) AFF A800 protocol support.	14
Table 11) Cables types to support 40Gb/sec or 100Gb/sec speeds.	15
Table 12) Onboard management interfaces.	16
Table 13) External USB port use-case scenarios.	16
Table 14) Maximum drive counts and capacities.	17
Table 15) Maximum aggregate and volume sizes.	17
Table 16) Supported shelves and shelf modules.	18
Table 17) AFF A800 chassis dimensions.	19
Table 18) AFF A800 HA watts and BTU ratings.	20
Table 19) Supported adapters for the AFF A800.	21
Table 20) List of orderable FRUs.	22

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1 AFF A800 Overview

The NetApp AFF A800 controller is the new high-end NetApp® AFF storage controller. The AFF A800 is a modern high-end all flash array, and includes:

- Up to 48 internal NVMe solid-state drives (SSDs) in a dense 4U form factor
- 100GbE Ethernet support; also includes 32Gb FC, 40GbE, and 25GbE support
- NVDIMMs for persistent write cache of data received but not yet committed to flash media
- Host-side NVMe/FC support for low-latency, high-performance remote direct memory access (RDMA) connectivity to the NVMe SSDs

As you would expect in an industry-leading NetApp high-end controller, the AFF A800 provides top-end application performance at low latencies by using the latest high-speed I/O technology.

What is the AFF A800 series?

Answer: The AFF A800 series is NetApp's industry-leading high-end AFF technology.

Are there other AFF A800 models?

Answer: No, the AFF A800 is the only model in the series.

What are some of the new features in the AFF A800 family?

Answer:

- Intel Skylake 24-core architecture (2 per controller, 96 cores per HA pair)
- Embedded NVMe connected SSDs
- Peripheral Component Interconnect Express (PCIe) Gen 3 16x wide architecture
- 640GB per node high-speed DDR4-2666 memory (1280GB for HA pair)
- External USB port that can be used to recover boot media or install a NetApp ONTAP® image
- Modern micro-USB serial console port

What are the new AFF A800 model transitions?

Answer: With the new features, capabilities, and performance, the high-end AFF A800 doesn't replace existing AFF models. So, there are no transitions to the new AFF A800 from existing models.

2 AFF A800 Controller and Chassis

Which components make up the AFF A800?

Answer: The NetApp AFF A800 components are the controller module, chassis, power supplies, fans, onboard and mezzanine-card-based 100GbE ports, and up to 48 internal NVMe SSDs.

What is the rack unit for the AFF A800 components?

Answer: The AFF A800 chassis is 4U high.

What are the AFF A800 model numbers?

Answer: The AFF A800 is the new high-end model number and the only member in this family.

Which model string extensions denote HA?

Answer: The AFF A800 dual-controller model string is AFF A800A.

Are the AFF A800 controllers hot-swappable?

Answer: The AFF A800 controller is hot-swappable after a takeover has successfully completed.

3 AFF A800 HA and Standalone Configurations

Which standalone and HA configurations are supported on the AFF A800?

Answer: Table 1 lists the configurations supported on the NetApp AFF A800 controller.

Table 1) Supported AFF A800 configurations.

Single-chassis HA with dual controllers	Typical HA configuration
Dual-chassis, each with HA dual controllers	Four-node MetroCluster (MetroCluster IP)

What is the naming convention for the AFF A800 configurations?

Answer: AFF A800A is a single-chassis HA configuration. AFF A800A in a four-node NetApp MetroCluster™ configuration shows in Hardware Universe as an AFF A800-4NMCIP.

Are dual-chassis HA configurations possible on the AFF A800 series?

Answer: No, the AFF A800 cannot span its chassis unless MetroCluster is used.

Is MetroCluster available on the AFF A800 series?

Answer: Yes, MetroCluster over TCP/IP (MetroCluster IP) software is available on the AFF A800 series in four-node configuration.

What is the rack unit for AFF A800 configurations?

Answer: Each AFF A800 chassis is 4U.

Which field upgrades are available with the AFF A800?

Answer: You can convert from an HA pair into a four-node MetroCluster IP configuration and add adapters..

Does hardware-assisted takeover work on the AFF A800?

Answer: Yes. Hardware-assisted takeover on the AFF A800 uses the baseboard management controller (BMC), and the hardware-assisted takeover functionality is similar to that of the Service Processor (SP) on previous-generation controller families. More information about the BMC is in section 4.

What are the NVRAM HA connections on the AFF A800?

Answer: The AFF A800 NVRAM uses two 100Gb connections for the HA interconnect that use ports e0b and e1b on both nodes, providing 200Gb/s total bandwidth. Using two 40GbE connections for the HA interconnects is also supported with MetroCluster IP; otherwise, HA interconnect ports run at 100GbE.

Which ports are used for the NVRAM HA connections on the AFF A800?

Answer: The AFF A800 NVRAM uses ports e0b and e1b for the HA connections.

Which ports are used for cluster interconnects on the AFF A800?

Answer: The AFF A800 uses two 100GbE ports e0a and e1a for cluster interconnects. For two-node switchless cluster (TNSC), the cluster interconnects run at 100GbE. With switched clusters or with MetroCluster-IP IP, the 100GbE ports can also be used at 40GbE. AFF A800 also supports 10GbE cluster interconnects by adding the X1147A 10GbE adapter into slots 2 and 4, but this approach isn't recommended for long term use due to performance concerns.

Does the AFF A800 series support FlexArray?

Answer: No, the AFF A800 does not support NetApp FlexArray® licensing to virtualize storage arrays.

Does the AFF A800 series support Foreign LUN Import (FLI)?

Answer: Yes, the AFF A800 supports FLI to import LUNs from other vendor arrays.

Does the AFF A800 support SnapLock?

Answer: NetApp SnapLock® software is supported in NetApp ONTAP 9 releases and available on the AFF A800 at launch.

Where is the upgrade procedure for replacing existing controllers with AFF A800?

Answer: Two approaches can be used to upgrade controllers to the AFF A800. The first is `vol move`, and the steps are covered in the [Controller Upgrade Express Guide](#). The other option is to use aggregate relocate (ARL), and you can find the procedure in [Using Aggregate Relocation to Upgrade Controller Hardware](#).

4 AFF A800 System Features

Does the AFF A800 have onboard flash?

Answer: No, with all-flash storage, the NetApp AFF A800 controller doesn't need to have onboard NVMe flash.

How much memory and NVRAM does the AFF A800 have?

Answer: Table 2 shows system memory.

Table 2) System memory for HA configurations.

HA Pairs	Physical Memory	Total NVRAM
AFF A800A	1280GB	64GB

Does the AFF A800 use all of the memory and NVRAM?

Answer: Yes. All AFF A800 models fully utilize the available memory and NVRAM at launch.

Which type of processors and how many processing cores does the AFF A800 have?

Answer: Table 3 gives processing core information.

Table 3) Processing cores for HA configurations.

HA Pairs	Architecture	Processors	Processing Cores	Processor Speed	Processor Model
AFF A800A	Sky Lake	4 x 64-bit 24 core	96	2.1GHz	8160

Which ONTAP release is required for the AFF A800?

Answer: The AFF A800 is supported starting in the NetApp ONTAP 9.4 RC1 release.

Which ONTAP build does the AFF A800 use?

Answer: The AFF A800 uses the x86_64 build.

What are NVDIMMs, and do they work the same as traditional NVMEM and NVRAM?

Answer: NVDIMMs have both DIMMs and flash along with controlling components such as an address register and a field-programmable gate array (FPGA). During normal operations, ONTAP uses DIMMs on the NVDIMM to maintain NVlog data the same as with memory in NVMEM or DIMMs on the NVRAM.

Does the AFF A800 destage NVlog data to flash for a persistent write record?

Answer: Yes. If an unexpected loss of power occurs, the NVDIMMs destage content from their DIMMs to flash memory on the same NVDIMM. During the initial boot process after power is restored, the NVlog is restaged from flash and then replayed, enabling the file system contents to include any acknowledged writes since the last consistency checkpoint.

Does the AFF A800 encrypt NVlog data before destaging NVRAM contents to flash?

Answer: No, the NVlog data in DIMMs on the NVDIMMs is not encrypted before being stored in flash. The reason is that the current NVDIMM standard NetApp uses doesn't support encryption as part of destaging.

How does AFF A800 use its NVDIMM battery?

Answer: If a dirty shutdown occurs, the battery provides power to destage NVlog content from DIMMs on the NVDIMM to its flash.

How many destages does the NVDIMM battery support?

Answer: A fully charged NVDIMM battery can handle more than 50 destage events.

How long does it take for the AFF A800 NVDIMM battery to charge?

Answer: In the NVDIMM architecture, only a small amount of battery capacity is consumed during destaging, and the battery turns itself off after destaging thereby saving its charge. Therefore, we don't expect battery recharging to interrupt the AFF A800 boot process. A completely discharged battery should reach sufficient charge to continue the boot process within an hour.

Where are the NVDIMM battery material safety data sheets (MSDS)?

Answer: Here are links to the lithium ion MSDS on the Field Portal:

[LG Lithium Ion MSDS](#)

[Sony Lithium Ion MSDS](#)

How does NetApp design its NVDIMM batteries to avoid potential lithium ion fires?

Answer: Here are some of the design considerations for NetApp NVDIMM lithium ion batteries and reasons NetApp has not had fire issues:

- NetApp does not use any rapid charge modes and does not allow the battery to be charged to an excessively high voltage.
- When the battery is charged to the correct voltage level, the charger is turned off until it requires a recharge.
- When the battery is in use, it is not in a high-current discharge mode.
- The battery has protection circuitry that prevents high discharge currents.

Does the AFF A800 series support remote management?

Answer: The AFF A800 uses a BMC, the same approach used earlier on the AFF A700s.

What are some of the BMC features?

Answer: The BMC performs field-replaceable unit (FRU) reporting and tracking, monitors and reports on internal sensors, and reports on and actively manages fan speed.

You can also access the BMC can from the serial console by toggling with Ctrl+G. Use Ctrl+D to get back to the serial console.

Is the BMC connected to both Ethernet and the serial console?

Answer: The BMC is always connected to Ethernet with its own TCP/IP address and the serial console can be accessed by logging into the BMC. If the BMC is accessed over Ethernet, you can toggle to the serial console with Ctrl+D. If you log in to the serial console, you can toggle into the BMC by using Ctrl+G. To get back to the serial console, toggle with Ctrl+D.

What are the recommended BMC firmware levels?

Answer: Table 4 lists the BMC firmware levels, which depend on the ONTAP release used.

Table 4) Recommended BMC firmware levels by ONTAP release.

	BMC Firmware Level
ONTAP 9.4 RC1	10.0

What are the recommended BIOS levels on the AFF A800?

Answer: Table 5 lists the BIOS levels, which depend on the ONTAP release used.

Table 5) Recommended BIOS levels by ONTAP release.

	BIOS Level
ONTAP 9.4 RC1	13.0

There is no nonmaskable interrupt (NMI) button on the AFF A800. How do I generate a core?

Answer: The BMC is required to generate a core file. After you log in to the BMC, run the command `system core`.

What are the system diagnostics in the AFF A800?

Answer: The AFF A800 uses system-level diagnostics, or SLDIAG, in place of the older SYSDIAG tool on most platforms. SLDIAG is accessed using maintenance mode during the boot process. If you enter `sysdiag` at the LOADER prompt, the system will boot into maintenance mode.

What is the boot medium in the AFF A800?

Answer: The AFF A800 uses an m.2 NVMe flash boot device.

Is NetApp Volume Encryption (NVE) supported on the AFF A800?

Answer: Yes.

Are NetApp ONTAP FlexGroup volumes supported on the AFF A800?

Answer: Yes.

Does the AFF A800 have Trusted Platform Module (TPM) on the motherboard?

Answer: Yes, but it is not used at this time.

Does ONTAP or onboard key manager (OKM) use TPM?

Answer: No, not at this time.

5 AFF A800 I/O

What is the AFF A800 base I/O configuration per node?

Answer: Refer to Table 6 for the NetApp AFF A800 base configuration per node.

Table 6) AFF A800 base configuration per node.

	Slot
100GbE adapter	1

What are the onboard AFF A800 ports?

Answer: Refer to Table 7 for the AFF A800 ports.

Table 7) AFF A800 onboard ports.

Port Type/Number per PCM	Label
2 x 100GbE	e0a, e0b
GbE (node hardware management)	BMC
GbE (ONTAP node management)	e0M
Serial console (micro-USB)	IOIOI
Serial console (RJ45)	IOIOI
USB 2.0	USB1 
USB 2.0	USB2 

What are the HA interconnect ports on the AFF A800?

Answer: Refer to Table 8 for HA interconnect port defaults and recommendations.

Table 8) AFF A800 HA interconnect options.

Default	Recommended	Supported with MetroCluster IP
e0b, e1b 100GbE ports	e0b, e1b 100GbE ports	e0b, e1b 40GbE ports

What are the cluster interconnect ports on the AFF A800?

Answer: Refer to Table 9 for cluster interconnect port defaults and recommendations.

Table 9) AFF A800 cluster interconnect options.

Default	Recommended	Supported Option 1	Supported Option 2 ¹
e0a, e1a 100GbE ports	e0a, e1a 100GbE ports	e0a, e1a 40GbE ports	e2a, e2b, e4a, e4b 10GbE ports (uses X1147A)

¹ Only recommended during upgrade from existing clusters using 10GbE cluster interconnects.

How can you determine cluster interconnect traffic?

Answer: Use the command `statistics lif show` to determine the amount of traffic on the cluster interconnects. If you set an interval, the command reports how much has been received and sent during that time.

How many slots does the AFF A800 have?

Answer: The AFF A800 has 5 PCIe Gen3 16x wide slots per node and 10 slots in an HA pair. However, with the base configuration of one 100GbE adapter in slot 1, that leaves 4 slots per node for I/O.

Which PCIe architecture does the AFF A800 use?

Answer: The AFF A800 uses the PCIe Gen 3 X16 wide architecture for motherboard connectivity to I/O slots.

What are the supported SFP+ and cables on AFF A800?

Answer: See the [Hardware Universe](#) for the latest information on supported SFPs and cables.

Which protocols are available by host I/O adapter type on AFF A800?

Answer: Refer to Table 10 for AFF A800 host-side protocol support by adapter type.

Table 10) AFF A800 protocol support.

Adapter	Protocols	Supported Speeds
100GbE (dual port)	NFS, CIFS, iSCSI (stateless offload)	100GbE 40GbE
32Gb FC (quad port)	NVME/FC FC	16/32Gb FC 8/16/32Gb FC
25GbE (dual port)	NFS, CIFS, iSCSI (stateless offload)	25GbE
10GbE (quad port)	NFS, CIFS, iSCSI	10GbE

Does the AFF A800 32Gb adapter support NVMe/FC?

Answer: Yes, the 32Gb FC adapter supports NVMe/FC at launch.

Does the AFF A800 32Gb adapter support both target and initiator modes?

Answer: Yes, the 32Gb FC ports support both modes.

Do the 32Gb FC ports autorange?

Answer: Yes, the 32Gb FC ports can autorange down to 8Gb and 16Gb speeds.

What is the bandwidth for the dual-port 100GbE adapter?

Answer: The total bandwidth of the 100GbE adapter is around 100Gbps.

How do I use 40GbE connections with the 100GbE adapter?

Answer: By plugging in a regular QSFP cable we used on the 40GbE adapter, the 100GbE port autoranges down to 40Gb/sec speed.

What are the supported cable types for 40Gb/sec and 100Gb/sec on the 100GbE adapter?

Answer: Refer to Table 11 for supported cable types for 40GbE or 100GbE connections.

Table 11) Cables types to support 40Gb/sec or 100Gb/sec speeds.

40GbE	100GbE
QSFP Ethernet Twinax or optical QSFP	QSFP28 Ethernet Twinax or optical QSFP28

Can the 100GbE adapter ports run at separate speeds?

Answer: Yes, the ports can run at either 40GbE or 100GbE speed independent of each other.

Do the 100GbE adapter ports fan out into multiple 40GbE or 10GbE connections?

Answer: No, there are no supported fan-out cables with the 100GbE ports.

Is the 25GbE adapter supported in the AFF A800?

Answer: Yes, the X1116A 25GbE adapter is supported on the AFF A800.

What type of cable is used with 25GbE ports?

Answer: The 25GbE ports use a SFP28 connection.

Does the 25GbE adapter also run at 10GbE speeds?

Answer: No, the X1116A 25GbE adapter runs only at 25GbE speeds.

What is the maximum number of Ethernet ports supported on the AFF A800?

Answer: The maximum number of Ethernet ports on the AFF A800 is 20 per node and 40 per HA pair, which counts the two onboard, the two ports in slot 1, and four quad port 10GbE adapters.

Where is the guide showing how to set up Cisco cluster interconnect switches?

Answer: See [Cluster Switch Setup Guide for Cisco Switches](#).

Which management interfaces does the AFF A800 have?

Answer: See Table 12 for AFF A800 management interfaces.

Table 12) Onboard management interfaces.

	Micro-USB Serial Console	RJ45 Serial Console	ONTAP Node Management	Hardware Node Management
Each node	1	1	1 (e0M)	1 (BMC)

Do the e0M and BMC ports support IPv6?

Answer: Yes, both ports support IPv6.

Are the external USB 2.0 ports supported?

Answer: Yes, the external USB ports can be used to boot NetApp ONTAP if the onboard boot media failed to install a particular release of ONTAP or to install a firmware service image. The external USB ports are enabled only during these activities and their activation is based on specific commands.

Which USB device is formatted for use with the AFF A800?

Answer: The USB device needs to have FAT32 formatting to use on the external USB ports.

Which use cases are allowed with the AFF A800 external USB ports?

Answer: Table 13 shows use cases for which the external USB ports can be used.

Table 13) External USB port use-case scenarios.

Scenario	Prerequisites	Command
Perform boot device recovery from LOADER prompt	• USB 2.0 device formatted to FAT32 with correct ONTAP image.tgz image • Not hot-pluggable; need to boot to LOADER prompt after USB device is inserted into external USB port	• <code>Boot_recovery</code> using the netboot image at the LOADER prompt • Select appropriate ONTAP image at the boot menu
Fetch ONTAP software for installation	• USB 2.0 device formatted to FAT32 with correct ONTAP image	• <code>System node image update/get</code> • Command has an additional option to fetch ONTAP from USB device
Fetch service image for firmware update	• USB 2.0 device formatted to FAT32 with correct service image	• <code>System node firmware download</code> • Command has an additional option to fetch ONTAP from USB device

At what speed does the AFF A800 serial console port run?

Answer: The AFF A800 serial console port runs at 115K baud rate.

6 AFF A800 Storage

What type of SSD is used for the internal drives?

Answer: The NetApp AFF A800 controller uses NVMe SSDs. Although the flash in the SSD is the same as our current SAS SSDs, the NVMe interface is optimized with flash for more throughput at lower latencies.

Are there other differences between NVMe SSDs and SAS SSDs?

Answer: Yes, the new NVMe SSDs use U.2 connections.

What size NVMe SSDs are supported at AFF A800 launch in May 2018?

Answer: Supported NVMe SSD sizes are 1.9TB, 3.8TB, 7.6TB SSDs. In August, NetApp plans to release a 15.3TB NVMe SSD and a 3.8TB NetApp Storage Encryption (NSE) NVMe SSD that can be used internally.

What NVMe SSD configurations are orderable on the AFF A800?

Answer: The AFF A800 is orderable with 24, 36, or 48 internal NVMe SSDs.

Can an existing SAS SSD be used internally on the AFF A800?

Answer: No, the AFF A800 has different SSD carriers and interfaces.

Are there requirements for installing NVMe SSDs in the AFF A800?

Answer: Yes, to optimize performance requires spreading the NVMe SSDs across quadrants on the shelf. To learn more review the storage section in the AFF A800 SE Presentation.

What is the maximum number of SSDs supported on the AFF A800 series?

Answer: Table 14 shows maximum drive counts and capacities.

Table 14) Maximum drive counts and capacities.

	Maximum Internal SSDs	Maximum SSDs
Standalone and HA	48	240

What are the maximum aggregate and volume sizes on the AFF A800 series?

Answer: Table 15 shows the maximum aggregate and volume sizes.

Table 15) Maximum aggregate and volume sizes.

	AFF A800
Maximum number of volumes	1000
Maximum aggregate size	800TiB
Maximum volume size	100TiB
Minimum root volume size	150GiB
Minimum root aggregate size	187GiB

Why are the minimum root aggregate and volume so much smaller on the AFF A800?

Answer: The AFF A800 saves system core files on the boot media versus the root volume, significantly reducing the size requirements.

Are system core files encrypted before being saved on the boot media?

Answer: Yes.

Which shelves and shelf modules are supported on the AFF A800 series?

Answer: Table 16 shows the supported shelves and shelf modules.

Table 16) Supported shelves and shelf modules.

Shelf	Shelf Module
DS224C (shelf migration)	IOM12
DS2246 (shelf migration)	IOM12

Is Advanced Drive Partitioning (ADP) supported on the AFF A800?

Answer: Yes, when the AFF A800 launches with NetApp ONTAP 9.4, up to 48 drives are partitioned to improve storage efficiency.

What approach is used by ADP to partition drives on the AFF A800?

Answer: ADP on the AFF A800 creates a root and two data partitions.

Is there a demonstration video on how NetApp RAID-TEC™ works?

Answer: Yes, the YouTube video [RAID-TEC Demonstration](#) can be shared with customers.

7 AFF A800 Chassis Power Supplies, Weight, and Thermals

What are the AFF A800 chassis dimensions?

Answer: For the most comprehensive information on NetApp AFF A800 dimensions and weights across various configurations, refer to the [Hardware Universe](#).

Table 17) AFF A800 chassis dimensions.

	Metric	English
Height	4U	
Height (measured)	17.5 cm	6.9 in
Width	44.7 cm	17.6 in
Chassis depth	87.6 cm	34.5 in
With cable management	92.9 cm	36.6 in

What are the AFF A800 environmental details?

Answer: For the most comprehensive information on AFF A800 environmental details, refer to the [Hardware Universe](#).

What are the AFF A800 weights?

Answer: With 24 internal NVMe SSDs, the AFF A800 weighs 55.90kg (123.2 pounds). With 48 internal NVMe SSDs, it weighs 61.1kg (134.7 pounds).

For the most comprehensive information on AFF A800 weight across various configurations, refer to the [Hardware Universe](#).

What are the wattage and BTU ratings for AFF A800 HA pairs?

Answer: For the most comprehensive information on AFF A800 wattage and BTU ratings across various configurations, refer to the [Hardware Universe](#).

Table 18) AFF A800 HA watts and BTU ratings.

	220V	
	Typical	Worse Case
Amps (A)	9.53A	11.5A
Watts (W)	1866W	2254W
BTU	6369 BTU	7693 BTU

Does the AFF A800 support both 110V and 220V power?

Answer: No, the AFF A800 supports only 220V.

How many power supply units (PSUs) does the AFF A800 have?

Answer: The AFF A800 has four PSUs with two installed in each node.

Are the AFF A800 power supplies assigned to a particular controller or to the chassis?

Answer: Even though the power supplies are installed in the node, they power up the chassis and not the node itself.

How many working power supplies are required to keep the chassis and nodes running?

Answer: The AFF A800 can continue to operate with any two working power supplies.

Is there a two minute shutdown rule if a PSU is removed from the AFF A800?

Answer: No, there is no two minute shutdown rule if a PSU is removed from the AFF A800 for an extended time.

What is the recommended rail kit for the AFF A800?

Answer: The recommended rail kit for the AFF A800 is the super rail kit with part number X-02659-00 and description "Kit, 4-Post, Square or Round-Hole, 24"-32" Rail."

What is the Energy Star rating for AFF A800?

Answer: With our new hardware released late last year, we designed to and tested against 80+ Platinum standards. However, although we design and test to these standards, we haven't gone through the formal certification.

8 Supported Adapters

For the latest information on NetApp AFF A800 FRUs, refer to the [Hardware Universe](#).

Table 19) Supported adapters for the AFF A800.

Adapter Category	Description	Marketing Part Number	Manufacturing Part Number
HA/MetroCluster	Dual 100GbE QSFP28	X1146A	111-03852
Block Access	Quad 32Gb FC with SR SFPs	X1135A	111-03648
Networking	Dual 100GbE QSFP28	X1146A	111-03852
	Dual 25GbE SFP28	X1147A	111-03854
	Quad 10GbE SFP+	X1116A	111-08853
Storage/Tape	Quad 12Gb SAS	X2071A	111-03801
	Quad 32Gb FC with SR SFPs	X1135A	111-03648

9 FRU List

For the latest information on NetApp AFF A800 FRUs, refer to the [Hardware Universe](#).

Table 20) List of orderable FRUs.

Marketing Part Number	Manufacturing Part Number	Description
X90001XA	111-03898	CHASSIS no PSU, no PCM, no Fan, w/MP A800
X93402A	111-03905	CTL, no PSU, no Fan, no DIMM, no HBA
X93144A	107-00215	DIMM,32G,ECC,DUAL-RANK,288P,DDR4-2666
X93143A	107-00216	DIMM,NV,16G,ECC,SINGLE-RANK,288P,DDR4-2666
X1146A	111-03852	NIC, 2-PT, no SFPs,40/100Gbe SFP28 PCIE
X1116A	111-03853	NIC, 2-PT, no SFPs, 25Gb SFP28 PCIE
X1147A	111-03854	NIC, 4-PT no SFPs, 10Gb QSFP PCIE
X2071A	111-03801	SUB ASSY,HBA, MiniSAS-HD,12G
X90-1135A	111-03649	HBA,PCle,4x32Gb FC,no SFPs,TARGET-INIT
X736A	114-00194	PSU AFF A700s, A800
X1847-R6	271-01847	BTRY,3V,COIN,LTHM,CR2032
X85388A	441-00071	ASSY,FAN,MODULE,AFF A700s
X98101A	111-03066	Boot Media, A800
X4001A	108-00677	R7,ASM,SSD,1.92TB,TLC,NVMe,Apollo
X4002A	108-00678	R7,ASM,SSD,3.84TB,TLC,NVMe,Apollo
X4004A	108-00679	R7,ASM,SSD,7.6TB,TLC,NVMe,Apollo
X3152A	271-00045	R7,BTRY,LI-ION,7.2V,2-CELL,CYL,GEN5,FAS2600

10 System Validation and Quality Assurance

We stress-test our subassemblies of the system individually, rather than the system as a whole. Our strategy is to place the greatest emphasis on the earlier steps of the assembly process. Our in-circuit test coverage is typically in the high 90% range, which is not easy to do when a controller has more than 10,000 components. We also incorporate advanced technologies to validate all the high-speed buses at in-circuit test. At functional test, we validate each functional block of the design. When the subassemblies come together at system test, we have very high confidence in the quality of each one, and we focus on testing the interconnects of those subassemblies. We believe this provides better overall test coverage of the system.

Here's a brief summary of the subassembly and system testing:

PCMs:

- All external I/O ports are thoroughly tested as well as all the internal buses. PCIe buses are placed under heavy stress test, because they are the backbones of the controller architecture.
- Entire physical memory is tested using two advanced algorithms.
- Service Processor functionality is heavily exercised during PCM testing.
- PCM functional testing ranges from 50 to 90 minutes, depending on platform, because I/O and memory have impact on test time.

System chassis:

- Data paths between all controllers (and all internal drives if applicable) are heavily exercised.
- Fan control is exercised.
- Chassis functional testing ranges from 25 to 40 minutes, depending on model.

ONTAP storage shelves:

- Full functionality of the controller is tested.
- All data paths to drives are exercised for 4 hours. The health of each drive is carefully examined at the end of the 4-hour drive I/O test.
- Drives are shipped integrated in the storage chassis; exceptions are DS4486 and DS460C.

System-level test:

- Interfaces between PCMs and chassis are tested.
- Interfaces between PCMs and storage shelves are tested.
- Basic functionality of system as configured is tested.

11 Version History

Revision	Date	Comment
1.0	May 2018	Initial release

Refer to the [Interoperability Matrix Tool \(IMT\)](#) on the NetApp Support site to validate that the exact product and feature versions described in this document are supported for your specific environment. The NetApp IMT defines the product components and versions that can be used to construct configurations that are supported by NetApp. Specific results depend on each customer's installation in accordance with published specifications.

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